

### **REMARKS**

Claims 1-7 are pending. The Examiner rejected claims 1-3, 5, and 7 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Publication No. 2002/0026856 (Suzuki). Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki in view of U.S. Patent No. 3,737,345 (Kudman). Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki in view of U.S. Patent No. 6,169,245 (Sharp). Applicants respectfully request reconsideration of the pending claims in view of the following remarks.

#### **Independent Claim 1**

Independent claim 1 is directed to a thermoelectric nanogranular material with an enhanced Seebeck coefficient that includes,

a processed thermoelectric nanogranular material including particles having a grain size  $d$ ;

wherein  $d$  is characterized by the relationship  $mfp/2 < d < 5mfp$ ;  
and

wherein  $mfp$  is the phonon-limited mean free path of an equivalent bulk thermoelectric material prior to processing a bulk thermoelectric material into the processed thermoelectric nanogranular material having a grain size  $d$ . (emphasis added).

Contrary to the Examiner's assertions (Office Action, Page 2), Suzuki does not teach or suggest a processed thermoelectric nanogranular material with particles having a grain size  $d$ , wherein  $d$  is characterized by the relationship  $mfp/2 < d < 5mfp$  and  $mfp$  is the phonon-limited mean free path of an equivalent bulk thermoelectric material prior to processing a bulk thermoelectric material into the processed thermoelectric nanogranular material.

Rather, Suzuki discloses a thermoelectric material having a thin film of nanometer-sized particles formed by depositing on a substrate only nanometer-sized fine particles (i.e., nano-sized

corpuscle) having their sizes (particle diameters) distributed within the range or limits of 0.5 nm through 100 nm, both inclusive, and forming them into a thin film state. (Suzuki, page 2, paragraph [0028]). In one embodiment of Suzuki, the nano-sized corpuscles are manufactured using a target (e.g., a semiconductor bulk material) introduced to an inert gas in a first chamber, wherein the target is irradiated with pulsed laser light to cause the target to emit constituent atoms in large quantities by laser ablation in the inert gas. The emitted atoms are cooled by collision reaction in the inert gas atmosphere and grow to the nano-sized corpuscles. (Suzuki, page 2, paragraph [0029] and [0030]). “The average particle diameter of the nano-sized corpuscles produced in the inert gas depends on the gas pressure.” (Suzuki, page 5, paragraph [0053], emphasis added). For example, to produce the nano-sized corpuscles, the diameters of which distribute within the range of 0.5 nm through 100 nm, the pressure of the inert gas in the first chamber is set to a value within the range of 0.1 Torr through 760 Torr. (Suzuki, page 3, paragraph [0034]). In other words, the diameter of the corpuscles in Suzuki is determined, and limited by, the pressure applied to the inert gas in the chamber. Thus, Suzuki cannot possibly teach or suggest a thermoelectric material wherein the grain size  $d$  is characterized by the relationship  $mfp/2 < d < 5mfp$ , as recited in claim 1. Moreover, the size of the corpuscles in Suzuki are determined by the pressure applied to the inert gas in the chamber during processing, not prior to processing the bulk thermoelectric material, as further recited in claim 1.

For at least the reasons set forth above, independent claim 1, and dependent claims 2-7, are patentable over the cited art and in condition for allowance.

**CONCLUSION**

Reconsideration and allowance are respectfully requested. In view of the above, each of the presently pending claims in this application is believed to be in condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. 65899-0726 from which the undersigned is authorized to draw. To the extent necessary, a petition for extension of time under 37 C.F.R. § 1.136 is hereby made, the fee for which should be charged to such deposit account number.

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Respectfully submitted,

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